ZooKeys 941: 107–120 (2020)
doi: 10.3897/zookeys.941.51344
https://zookeys.pensoft.net

RESEARCH ARTICLE

A peer-reviewed open-access journal
ZooKeys
Launched to accelerate biodiversity research

Description of a new *Barsine* Walker, 1854 from India and Nepal (Lepidoptera, Erebidae, Arctiinae, Lithosiini)

Anton V. Volynkin[1,2], Navneet Singh[3], Jagbir Singh Kirti[4], Harvinder Singh Datta[4]

1 *Altai State University, Lenina Avenue, 61, RF-656049, Barnaul, Russia* **2** *National Research Tomsk State University, Lenina Avenue, 36, RF-634050, Tomsk, Russia* **3** *Zoological Survey of India, M-Block, New Alipore, Kolkata, 700053, West Bengal, India* **4** *Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, 147002, India*

Corresponding author: Navneet Singh (nsgill007@gmail.com)

Academic editor: A. Zilli | Received 24 February 2020 | Accepted 26 April 2020 | Published 16 June 2020

http://zoobank.org/CF545A32-6B77-474C-A8C8-776473CCB7C8

Citation: Volynkin AV, Singh N, Kirti JS, Datta HS (2020) Description of a new *Barsine* Walker, 1854 from India and Nepal (Lepidoptera, Erebidae, Arctiinae, Lithosiini). ZooKeys 941: 107–120. https://doi.org/10.3897/zookeys.941.51344

Abstract

A new species, *B. kirata* Volynkin & N. Singh, **sp. nov.**, similar to *B. germana*, is described from India and Nepal. The existence of two colour forms in some species of the genus *Barsine* Walker, 1854 is revealed. A new synonymy is established for *Barsine germana* (Rothschild, 1913), which includes two forms that were described as three different species: *Barsine germana* (Rothschild, 1913) (the yellow form) = *B. valvalis* Kaleka, 2003, **syn. nov.**, and *B. thomasi* Kaleka, 2003, **syn. nov.** (the red-spotted forms).

Keywords

Asia, *Barsine kirata*, *B. valvalis* Kaleka, *B. thomasi* Kaleka, new species, new synonymy, red and yellow forms

Introduction

Until recently, *Barsine* Walker, 1854 was considered to be a very large and polyphyletic genus including more than a hundred valid species (Holloway 2001; Kaleka 2003,

Copyright *Anton V. Volynkin et al.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

2018; Černý and Pinratana 2009; Bucsek 2012, 2014; Dubatolov et al. 2012; Dubatolov and Bucsek 2013; Wu et al. 2013; Kirti and Singh 2015, 2016; Černý 2016; Volynkin and Černý 2016a, b, c, 2017a, b, c, d, 2018a, b, 2019; Bayarsaikhan et al. 2018; Huang et al. 2018, 2019; Joshi et al. 2018; Spitsyn et al. 2018; Volynkin 2018; Volynkin et al. 2018, 2019a, b, c, d). Volynkin et al. (2019e) separated several lineages into distinct genera, and now *Barsine* includes 65 species and five subspecies of its type species, *B. defecta* Walker, 1854, having a basal saccular process.

Dissections of numerous specimens of various species of *Barsine* displayed the existence of two colour forms in some of them: the common form having reddish forewing pattern elements together with black ones, and the yellow form lacking reddish forewing pattern elements. The latter, yellow form is usually very rare and has so far been found only in *B. defecta* (Figs 19, 20), *B. orientalis bigamica* Černý, 2009 (illustrated by Bayarsaikhan et al. 2018), *B. gratissima* (de Joannis, 1930), *B. obsoleta* (Reich, 1937), and *B. cacharensis* N. Singh & Kirti, 2016. In some species, intraspecific variation is high and expressed not only in the presence or absence of red pattern elements but also in the shade of the ground colour and red spots, the size of the red and black pattern elements, body size, and even forewing shape (Figs 1–10). Such polymorphism is obvious evidence of a polygenic inheritance, and this matter needs extensive molecular study.

The red and yellow forms of some species have been described as distinct species, as in the case of *Barsine germana* (Rothschild, 1913) (the yellow form; Figs 1–3), and *B. valvalis* Kaleka, 2003 and *B. thomasi* Kaleka, 2003 (the red-spotted form; Figs 4–10). In the present paper, we synonymize *B. valvalis* and *B. thomasi* with *B. germana*. In addition, dissections of red-spotted specimens of this group from various regions of Nepal and India revealed the existence of two species very similar externally but clearly different in their genitalia structures. One of them is described below.

Materials and methods

Abbreviations of the depositories used: **NHMUK** = Natural History Museum (formerly British Museum of Natural History, London, UK); **NZCZSI** = National Zoological Collection, Zoological Survey of India (Kolkata, India); **MWM/ZSM** = The Bavarian State Collection of Zoology (Museum Witt München / Zoologische Staatssammlung München, Munich, Germany); **ZFMK** = Zoological Research Museum Alexander Koenig (Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany).

The genitalia of specimens deposited in NHMUK, MWM/ZSM, NZCZSI, and ZFMK collections were dissected, stained with eosin B and mounted in Euparal on glass slides using standard methods of preparation (Lafontaine and Mikkola 1987; Fibiger 2007). Photographs of imagos deposited in NHMUK and MWM/ZSM were taken using a Nikon D3100/AF-S camera equipped with a Nikkor 18–55 mm lens. Genital preparations made by A.V. Volynkin were photographed with the same camera attached to a microscope with an LM-scope adapter.

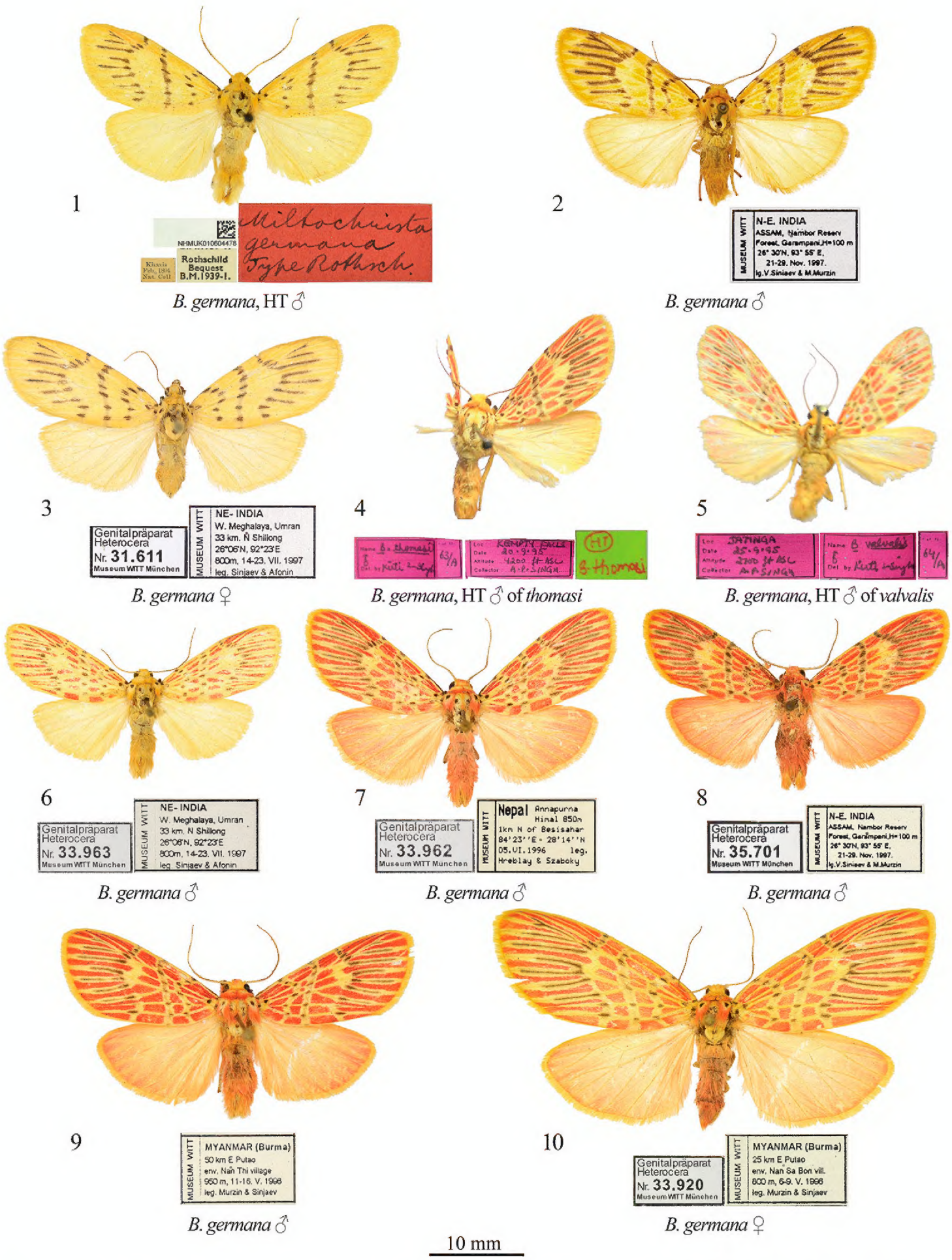
Taxonomic part

***Barsine germana* (Rothschild, 1913)**
Figs 1–10, 21–24, 29, 30

Miltochrista germana Rothschild 1913: 214 (type locality: [India, Meghalaya, the Khasi Hills] "Khasia Hills, Assam").
Barsine valvalis Kaleka 2003: 97, figs A, 12–19 (type locality: [India] "Assam: North Cachar Hills, Jatinga"), syn. nov.
Barsine thomasi Kaleka 2003: 100, figs B, 25–32 (type locality: [India, Uttarakhand] "Uttar Pradesh: Kempty falls"), syn. nov.

Type material examined. ***Holotype*** of *Miltochrista germana* (by monotypy) (Fig. 1): male, red handwritten label "*Miltochrista germana* Type Rothsch." / printed label "Khasis, Feb. 1894, Nat. Coll." / printed label "Rothschild Bequest B.M. 1939–1." / printed label with QR-code "NHMUK010604478" (Coll. NHMUK). ***Holotype*** of *Barsine valvalis* (Figs 5, 24): male, lilac label "Loc. Jatinga | Date 25.9.95 | Altitude 2700 ft. A.S.L. | Collector A.P. Singh" / lilac label "64/ A" / lilac label "Name *B. valvalis* | ♂ | Det. by Kirti & Singh", gen. prep. by H.S. Datta (Coll. NZCZSI). ***Holotype*** of *Barsine thomasi* (Figs 4, 23): male, lilac label "Loc. Kempty Falls | Date 20.9.95 | Altitude 4200 ft. A.S.L. | Collector A.P. Singh" / lilac label "63/ A" / lilac label "Name *B. thomasi* | ♂ | Det. by Kirti & Singh" / lettuce green label "HT | *B. thomasi*", gen. prep. by H.S. Datta (Coll. NZCZSI).

Other material examined. **India.** 1 male, Khasis, Oct. 1896, Nat. Coll., slide NHMUK010313291 Volynkin (Coll. NHMUK); 1 female, Khasia Hills. Assam / Rothschild Bequest B.M. 1939–1., slide NHMUK010313292 Volynkin (Coll. NHMUK); 1 female, NE India, W Meghalaya, Garo Hills, Nokrek National Park, 25°40'N, 91°04'E, 1150 m, 2–13.VII 1997, leg. Afonin & Sinyaev (Coll. MWM/ZSM); 28 males, 19 females, NE India, W Meghalaya, Umran, 33 km N Shillong, 26°06'N, 92°23'E, 800 m, 14–23.VII.1997, leg. Sinyaev & Afonin, slides MWM 31610, MWM 33963 (males), MWM 31611 (female) Volynkin (Coll. MWM/ZSM); 21 males, 11 females, NE India, Assam, Nameri Nat. Park, 40 km N Tezpur, 150 m, 27°20'N, 93°15'E, 24.VII–2.VIII.1997, leg. Sinyaev & Murzin, slides MWM 33964 (male), MWM 33965 (female) Volynkin (Coll. MWM/ZSM); 74 males, 12 females, NE India, Assam, Nambor Reserve Forest, Garampani, h = 100 m, 26°30'N, 93°56'E, 21–29.XI.1997, leg. V. Sinyaev & M. Murzin, slides MWM 31612, MWM 31617, MWM 33922, MWM 35701 (males), MWM 31613, MWM 33923, MWM 35703 (females) Volynkin (Coll. MWM/ZSM); 5 males, NE India, Arunachal Pr., Etalin vicinity, 28°36'56"N, 95°53'21"E, 700m, 12–25.V.2012, L. Dembický & O. Šauša leg., slide MWM 35704 Volynkin (Coll. MWM/ZSM); 4 males, [NE India] Assam: Haflong: Jatinga, 01.X.[19]95 (Coll. NZCZSI). **Nepal**: 21 males, 2 females, Nepal, Annapurna Himal, Geirigan village, 1340 m, 28°20'N, 83°45'E, 25.VI.1996, leg. Gy. M. László & G. Ronkay, slides MWM 33949 (male), MWM 33950 (female) Volynkin



Figures 1–10. *Barsine germana*: adults **1** holotype male, NE India (NHMUK) **2** male, northeastern India (MWM/ZSM) **3** female, northeastern India (MWM/ZSM) **4** Holotype male of *B. thomasi* (NZCZSI) **5** holotype male of *B. valvalis* (NZCZSI) **6** male, northeastern India (MWM/ZSM) **7** male, C Nepal (MWM/ZSM) **8** male, northeastern India (MWM/ZSM) **9** male, northern Myanmar (MWM/ZSM) **10** female, northern Myanmar (MWM/ZSM).

(Coll. MWM/ZSM); 6 males, 1 female, Nepal, Annapurna Himal, 1000m, 1 km S of Bahundanda, 28°20'N, 84°25'E, 06.VI.1996, leg. Hreblay & Szaboky (Coll. MWM/ZSM); 1 male, Nepal, Annapurna Himal, Ulleri, 1900 m, 28°23'N, 83°43'E, 3.X.1994, leg. Csorba & Ronkay (Coll. MWM/ZSM); 1 male, Nepal, Annapurna Himal, 850 m, 1 km N of Besisahar, 28°14'N, 84°23'E, 05.VI.1996, leg. Hreblay & Szaboky, slide MWM 33962 Volynkin (Coll. MWM/ZSM). **Myanmar**: 45 males, 18 females, Myanmar (Burma), 50 km E Putao, env. Nan Thi village, 950 m, 11–16.V 1998, leg. Murzin & Sinyaev, slide MWM 33921 (male) Volynkin (Coll. MWM/ZSM); 53 males, 17 females, Myanmar (Burma), 25 km E Putao, env. Nan Sa Bon village, 800 m, 6–9.V.1998, leg. Murzin & Sinyaev, slides MWM 33919 (male), MWM 33920 (female) Volynkin (Coll. MWM/ZSM); 21 male, 2 females, Myanmar (Burma), 21 km E Putao Nan Sa Bon village 550 m, 1–5.V.1998, leg. Murzin & Sinyaev (Coll. MWM/ZSM).

Remarks. Joshi et al. (2018) considered this species to consist only of yellow-patterned individuals matching the holotype (Figs 1–3). Nonetheless, dissections of similarly patterned red-spotted syntopic specimens (Figs 4–10) revealed these two color forms to be conspecific. The red-patterned form had been described twice before by Kaleka (2003) as *B. thomasi* Kaleka, 2003 (Figs 4, 23) and as *B. valvalis* Kaleka, 2003 (Figs 5, 24). These names are therefore synonymized here with *B. germana*.

The holotype of *B. germana* is undissected. However, the senior author has microscopically examined the tips of its valvae, which have the distal saccular process structure identical to those in the holotypes of *B. valvalis* and *B. thomasi*. The holotype is also externally similar to specimens from the same region of India, and clearly different from *B. kirata*, sp. nov. A detailed comparison of *B. germana* with *B. kirata* sp. nov. is provided below.

Barsine germana varies considerably in its size: the forewing length is 13–17 mm in males and 16–23 mm in females.

Distribution. Northern (Uttarakhand) and northeastern India (Meghalaya, Assam, Arunachal Pradesh) (Rothschild 1913; Kaleka 2003; Joshi et al. 2018), eastern Nepal, and northern Myanmar (Kachin state).

Barsine kirata **Volynkin & N. Singh, sp. nov.**
http://zoobank.org/487A79AB-5ACC-44D7-BDE8-DBB8187FFB41
Figs 11–18, 25–28, 31, 32

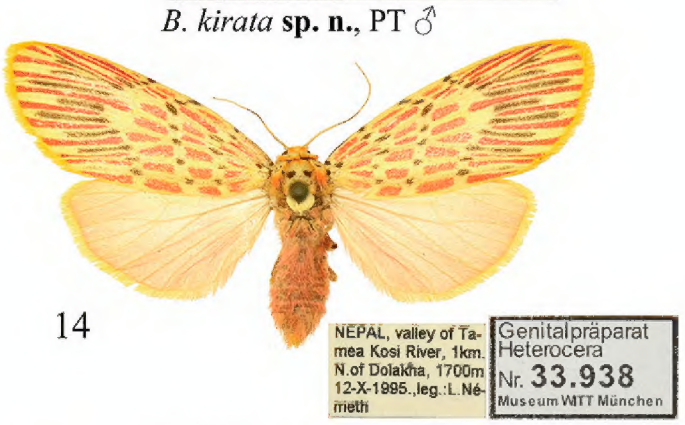
Type material. ***Holotype*** (Figs 11, 25): male, "N-E. India, Assam, Nambor Reserv[e] Forest, Garampani, H = 100 m, 26°20'N, 93°55'E, 21–20. Nov. [IX] 1997, leg. V. Siniaev & M. Murzin", slide MWM 35702 Volynkin (Coll. MWM/ZSM).

Paratypes. **India**: 1 male, same data as in the holotype (Coll. MWM/ZSM); 6 males, India, Andhra Pradesh, Visakhapatnam, Paderu, 08.IX.2018, leg. Navneet Singh & Party, gen. preps by H.S. Datta (Coll. NZCZSI); **Nepal**: 1 male, Nepal, Tana-

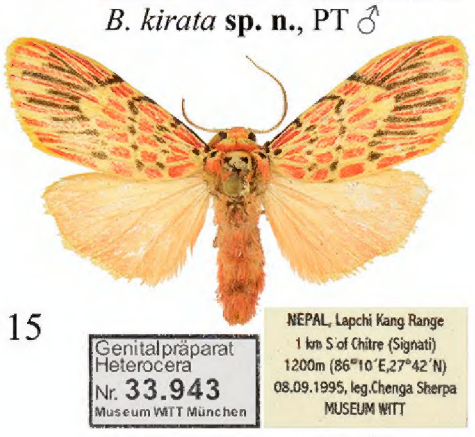
B. kirata **sp. n.**, HT ♂

B. kirata **sp. n.**, PT ♂

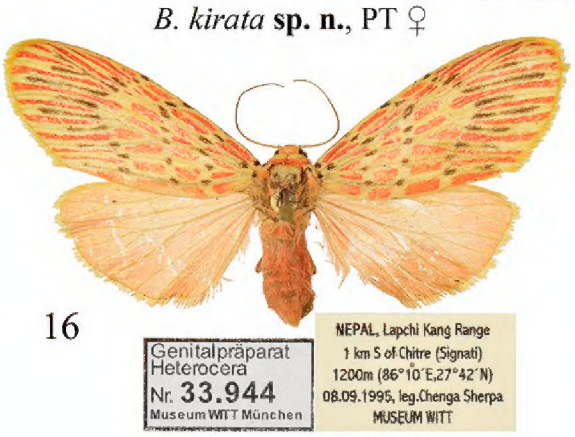
B. kirata **sp. n.**, PT ♂



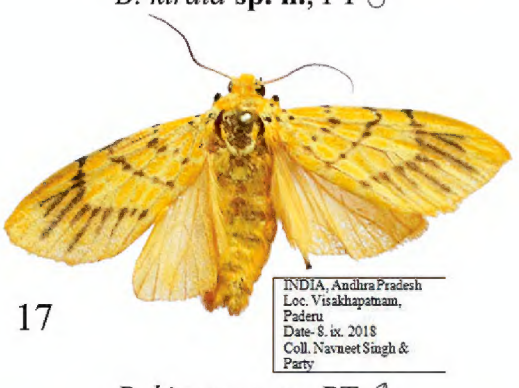
B. kirata **sp. n.**, PT ♀



B. kirata **sp. n.**, PT ♂

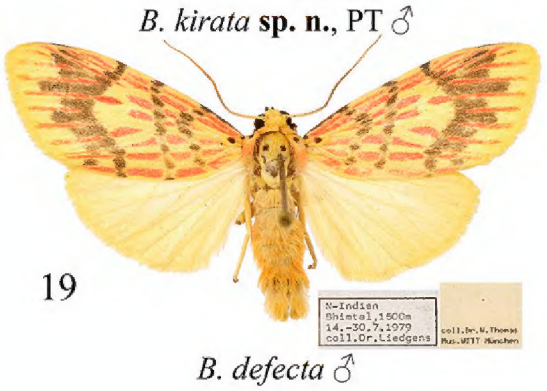


B. kirata **sp. n.**, PT ♀



B. kirata **sp. n.**, PT ♂

B. kirata **sp. n.**, PT ♂

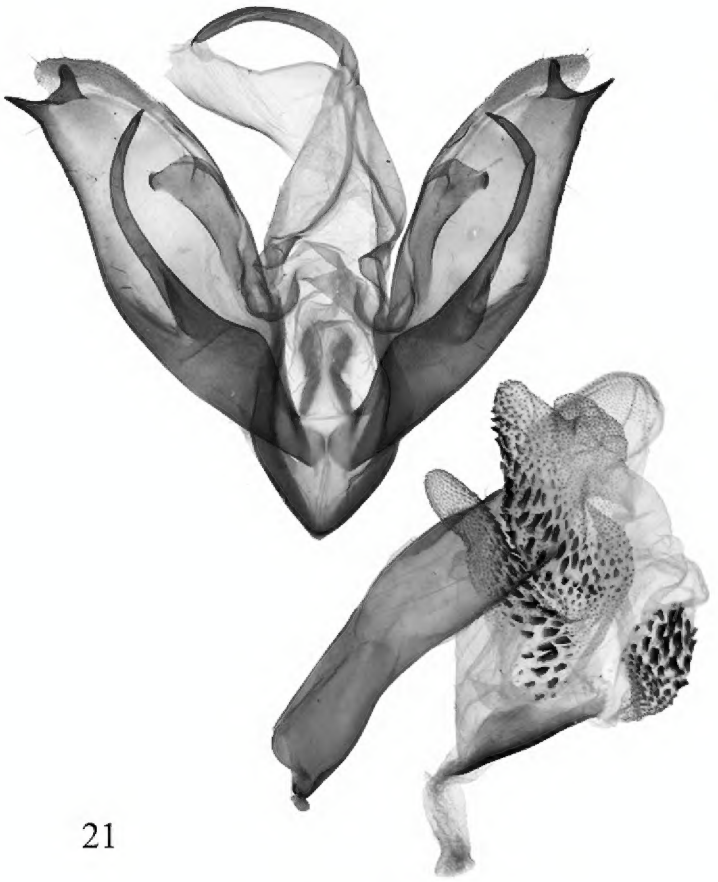


B. defecta ♂

B. defecta ♂

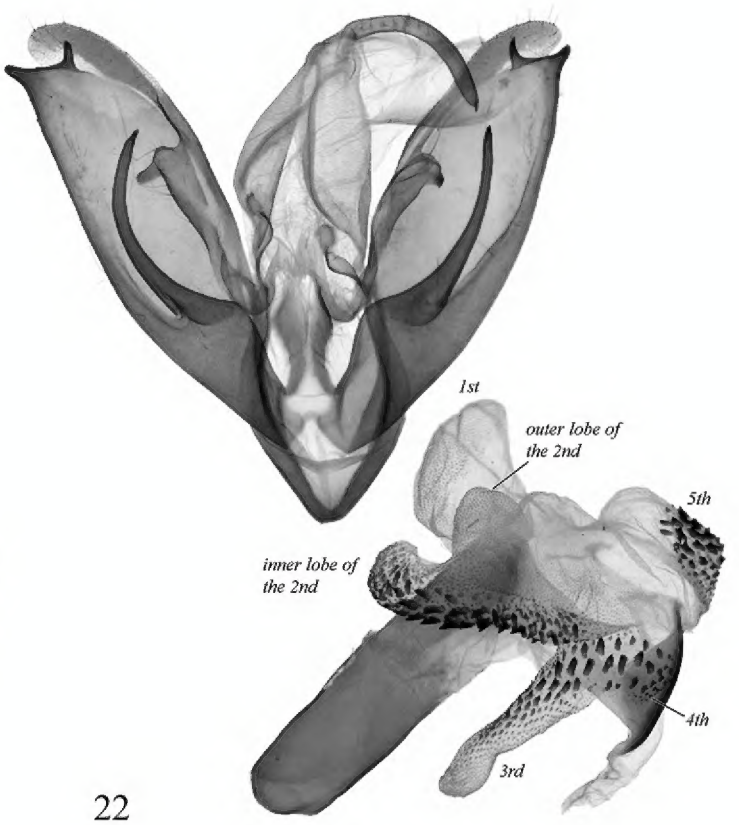
10 mm

Figures 11–20. *Barsine* spp.: adults **11–18** *B. kirata* sp. nov. **11** holotype male, northeastern India (MWM/ZSM) **12** paratype male, Nepal (MWM/ZSM) **13** paratype male, Nepal (MWM/ZSM) **14** paratype female, Nepal (MWM/ZSM) **15** paratype male, Nepal (MWM/ZSM) **16** paratype female, Nepal (MWM/ZSM) **17** paratype male, southeastern India (NZCZSI) **18** paratype male, southeastern India (NZCZSI) **19, 20** *B. defecta*: **19** male, N India (MWM/ZSM) **20** male, N India (MWM/ZSM).



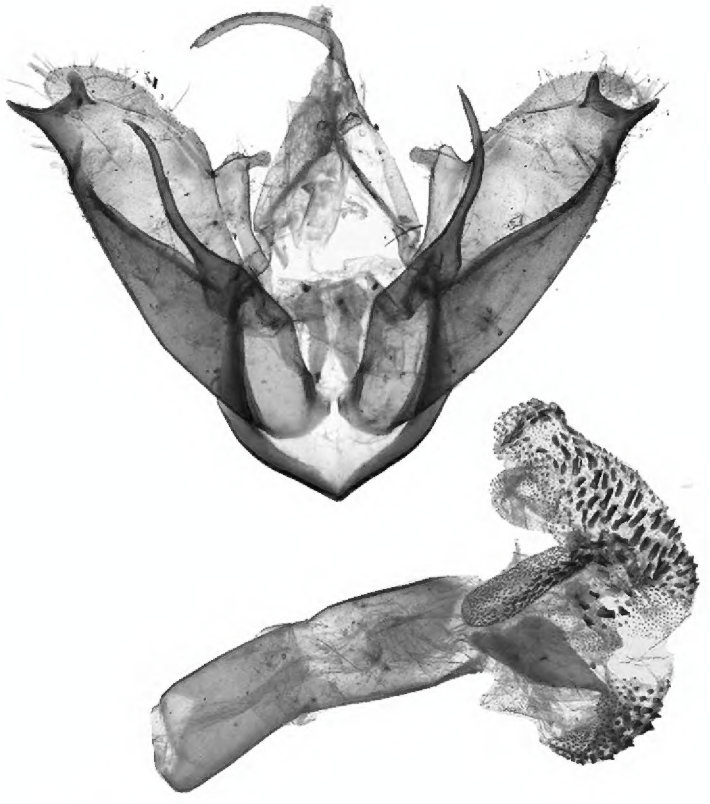
21

B. germana
NE India, Assam, Nameri, slide MWM 33964



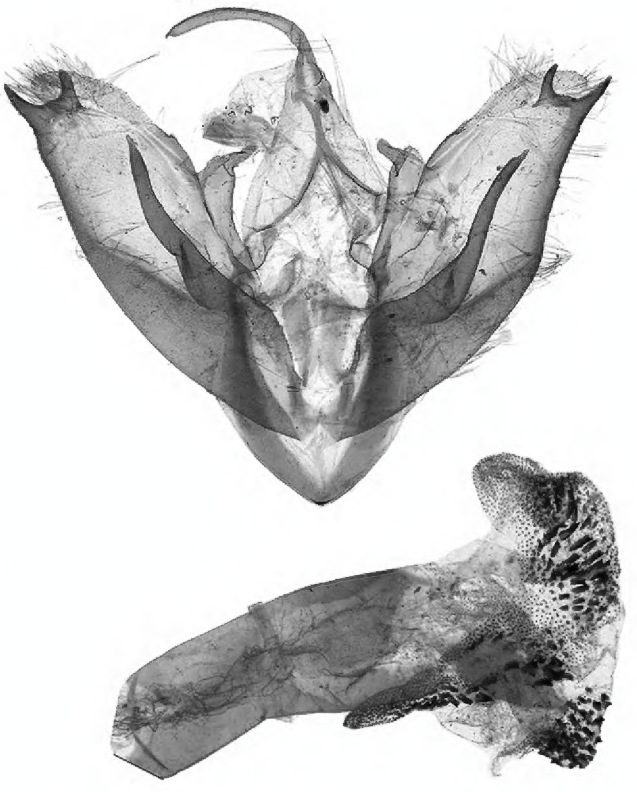
22

B. germana
Nepal, Annapurna Himal, slide MWM 33962



23

B. germana*, HT of *thomasi
N India, Uttarakhand, Kempty Falls, gen. prep. H.S. Datta



24

B. germana*, HT of *valvalis
NE India, Assam, Jatinga, gen. prep. H.S. Datta

Figures 21–24. *Barsine germana*: male genitalia **21** northeastern India, slide MWM 33964 Volynkin **22** Nepal, slide MWM 33962 Volynkin **23** holotype of *B. thomasi*, northern India, prep. H.S. Datta **24** holotype of *B. valvalis*, northeastern India, prep. H.S. Datta.

houn distr., Baisakhe Ghat, 10 km W Duleguunda, 630 m, 10.X.1994, leg. Csorba & Ronkay, slide MWM 33961 Volynkin (Coll. MWM/ZSM); 2 females, Nepal, valley of Tamea Kosi River, 1 km N of Dolakha, 1700 m, 12.X.1995, leg. L. Németh, slide MWM 33938 Volynkin (Coll. MWM/ZSM); 1 male, Nepal, valley of Tamea Kosi River, 5 km S of Piguti, 950m, 8/9.X.1995, leg.: L. Németh, slide MWM 33937 Volynkin (Coll. MWM/ZSM); 2 males, 19 females, Nepal, Lapchi Kang Range, 1 km S of Chitre (Signati), 1200m, (27°42'N, 86°10'E), 08.09.1995, leg. Chenga Sherpa, Museum Witt, slides MWM 33943 (male), MWM 33944 (female) Volynkin (Coll. MWM/ZSM); 3 males, 5 females, Nepal, Tanahoun distr., Bimalnager village, 530 m, 12.X.1994, leg. Csorba & Ronkay (Coll. MWM/ZSM); 7 males, 1 female, Nepal, Ganesh Himal, valley of Trisuli River, 2 km S of Betrawati, 930 m, 25.IX.1995, leg. L. Németh, slide MWM 33918 (male) Volynkin (Coll. MWM/ZSM); 2 males, Nepal, Ganesh Himal, 1040 m, Mailung Khola, ca 20 km NE Trisuli, 28°04'5"N, 85°12'5"E, 24.IX.1995, leg. B. Herczig & Gy. M. László (Coll. MWM/ZSM); 1 male, Nepal, Royal Chitwan National Park, Island Jungle Resort, 240 m, 21–23.VI.1993, leg. M. Hreblay, G. Csorba (Coll. MWM/ZSM).

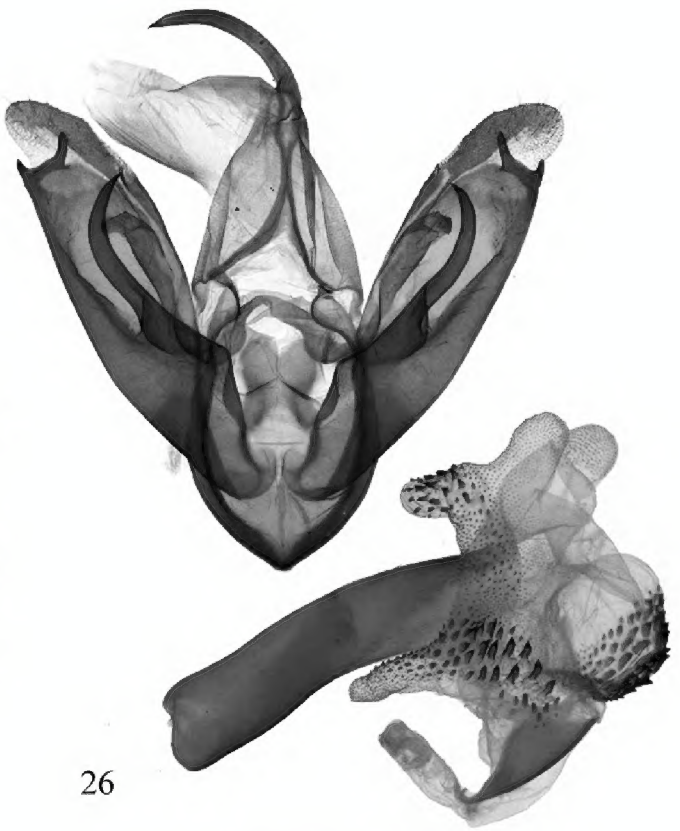
Remarks. Kirti and Singh (2016) erroneously recorded this species from India as *B. orientalis bigamica* Černý, 2009. Like *B. germana*, *B. kirata* sp. nov. is dimorphic, but the yellow form (Figs 17, 18) is rare, and, so far, known only from the state of Andhra Pradesh (southeast India).

Diagnosis. The new species (Figs 11–18) is very similar externally to *B. germana* (Figs 1–10) and can be distinguished from it by its less wavy antemedial transverse line. The male genital capsule of the new species (Figs 25–28) differs clearly from that of *B. germana* (Figs 21–24) by the distal ventral process of the valva having a short distal lobe directed dorso-distally and the longer dorsal lobe dorsally directed, while in *B. germana* the distal lobe is more elongated and distally directed and the dorsal lobe is dorso-distally directed. Additionally, in *B. kirata* sp. nov. the juxta is broader than that of *B. germana*, the basal saccular process is stouter and more curved, the distal lobe of valva is larger, and the distal part of the distal ventral process of valva is more robust. The vesica of *B. kirata* sp. nov. differs from that of *B. germana* by its slightly narrower 1st medial diverticulum, the smaller cornuti on the 2nd medial diverticulum, and the slightly less elongated 3rd medial diverticulum. The female genitalia of the new species (Figs 31, 32) clearly differ from those of *B. germana* (29, 30) by the significantly shorter ductus bursae with shorter subostial folds, the wrinkled posterior sclerotised section of corpus bursae, the slightly smaller signum, the presence of the second, band-like signum in the anterior section of corpus bursae (absent in *B. germana*), and the slightly smaller lateral membranous protrusion of the corpus bursae.

Description. ***External morphology of adults*** (Figs 11–18). Wingspan 14.5–16 mm in males (15 mm in holotype) and 18–20 mm in females. Male antennae ciliate, female antennae filiform, pale ochreous in both sexes. Head crimson with yellow spot on frons. Thorax yellow, with three black dots; collar and tegulae yellow with crimson margins. Forewing broad with slightly elongated and rounded apex. Forewing ground colour yellow, with a pattern of black dots and strokes and various-

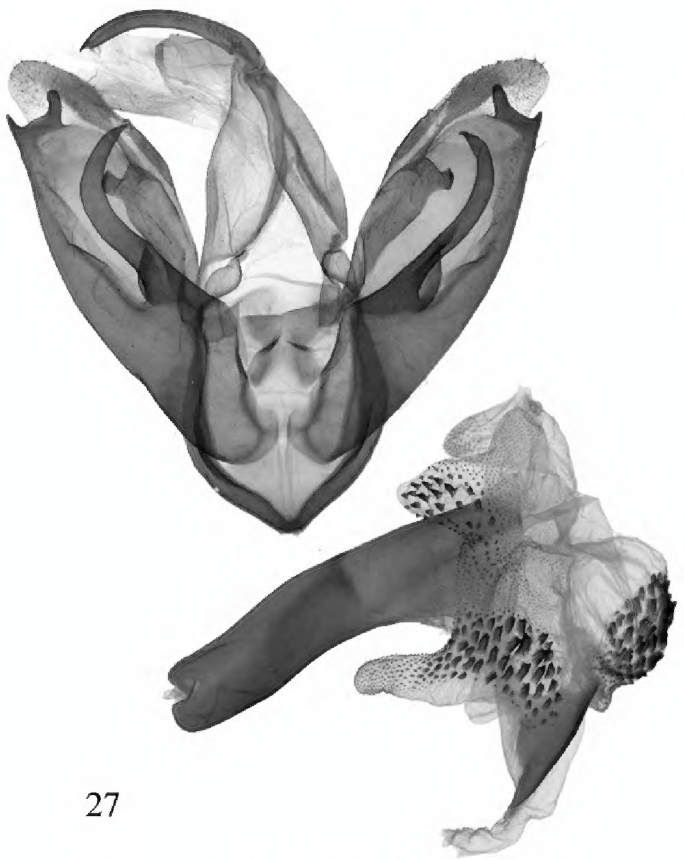
25

***B. kirata* sp. n., HT**
NE India, Assam, Nambor, slide MWM 35702



26

***B. kirata* sp. n., PT**
E Nepal, Tamea Kosi River vall., slide MWM 33937



27

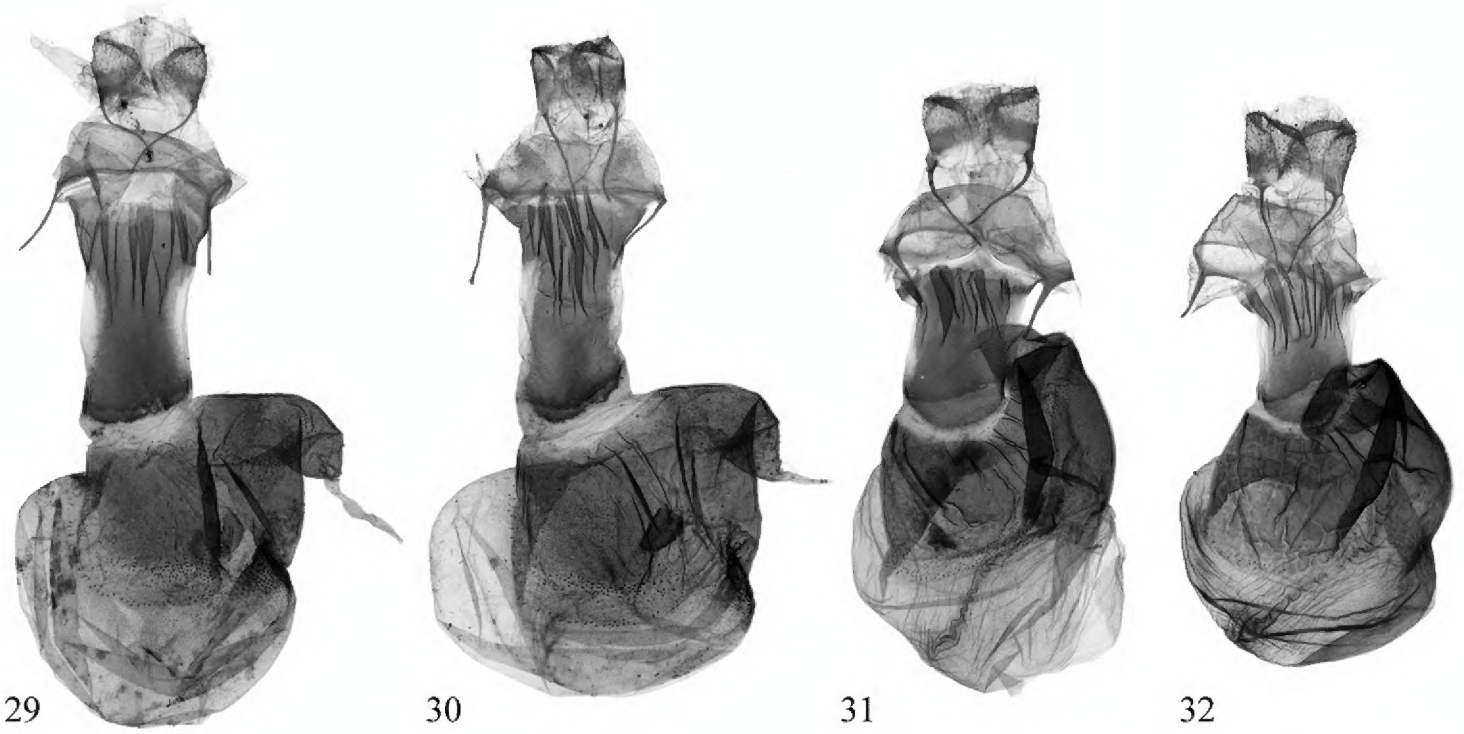
***B. kirata* sp. n., PT**
north of C Nepal, Ganesh Himal, slide MWM 33918

28

***B. kirata* sp. n., PT**
SE India, Andhra Pradesh, Visakhapatnam, prep. H.S. Datta

Figures 25–28. *Barsine kirata* sp. nov., male genitalia **25** holotype, northeastern India, slide MWM 35702 Volynkin **26** paratype, eastern Nepal, slide MWM 33937 Volynkin **27** paratype, central Nepal, slide MWM 33918 Volynkin **28** paratype, southeastern India, prep. H.S. Datta.

shaped crimson spots and strokes between veins; costa between base and antemedial line black; basal spot very small, black; subbasal spot black, round; antemedial line W-like wavy, black, interrupted into a series of variously shaped, small spots on veins;



Figures 29–32. *Barsine* spp.: female genitalia **29** *B. germana*, Nepal, slide MWM 33923 Volynkin **30** *B. germana*, northern Myanmar, slide MWM 33920 Volynkin **31** *B. kirata* sp. nov., paratype, Nepal, slide MWM 33944 Volynkin **32** *B. kirata* sp. nov., paratype, Nepal, slide MWM 33938 Volynkin.

medial line almost straight, angled inwards at costa, interrupted into a series of variously shaped small spots on veins; postmedial line smoothly curved outwards medially, presented as a series of black thin strokes of different lengths between veins; cilia amber yellow. Hindwing pale pink with yellowish suffusion along veins; cilia amber yellow along outer margin and apex, and pink along anal margin. Yellow form of species lacks all reddish pattern elements. Abdomen pink with admixture of yellow scales. ***Male genitalia*** (Figs 25–28). Tegumen moderately broad, shorter than valva; vinculum short but robust, V-shaped with convex lateral margins. Valva massive, with almost parallel margins; medial costal process broadly trigonal, with convex outer margin and slightly broadened and blunted tip; distal costal process very small, tubercle-shaped; distal lobe of valva large, oblique; sacculus broad, its basal process robust, broad, curved dorsally, apically rounded, reaches the distal costal process; distal ventral process broad, bilobate, its dorsal lobe approximatly two 2 times longer than distal lobe, narrow, apically blunted, directed dorsally; distal lobe short, thorn-shaped, directed dorso-distally. Uncus narrow, laterally flattened, curved, medially broadened, with claw-like tip; tuba analis broad. Scaphium narrow, weakly sclerotized. Juxta weakly sclerotized, X-shaped, with broader apical lobes. Aedeagus elongated, narrow, slightly curved medially and broadened distally. Vesica membranous, short and broad, with several diverticula: 1st medial diverticulum elongated, sack-like with rounded tip, its distal half weakly granulated; 2nd medial diverticulum bilobate, its inner lobe covered with numerous variously sized short but robust cornuti, outer lobe weakly granulated; 3rd medial diverticulum long, covered with numerous vari-

ously sized short but robust trigonal cornuti; 4th medial diverticulum small, globular, covered with small trigonal cornuti; 5th medial diverticulum broadly globular, its outer surface with broad cluster of small, trigonal cornuti of various sizes; basal diverticulum absent; distal plate of vesica broad, trigonal with slightly convex outer margin, heavily sclerotized. ***Female genitalia*** (Figs 31, 32). Ostium bursae broad. Ductus bursae dorso-ventrally flattened, sclerotized, its lateral margins more weakly sclerotized than medial part; posterior section of ductus bursae slightly broadened, with several narrow longitudinal subostial folds. Corpus bursae broad, sac-like, with posterior section moderately sclerotized with wrinkled posterior margin ventrally, and reniform signum dorsally; border between posterior and anterior sections of corpus bursae weakly sclerotized, with a band of short scobination; anterior section of corpus bursae thick and membranous, with a band-like signum surrounded by a rugose area. Appendix bursae weakly sclerotized and granulated, short, conical, situated postero-laterally, directed posteriorly and curved inwards. Apophyses long and thin, apophyses posteriores thinner and ca 1.8 times longer than apophyses anteriores. Papillae anales broad, trapezoidal, weakly setose.

Distribution. The new species is known from northeastern India (Sikkim, Darjeeling, and Assam) (Kirti and Singh 2016, as *B. orientalis bigamica*), southeastern India, and Nepal (present study).

Etymology. The Kirata are the people inhabiting the Himalayas and northeastern India.

Acknowledgements

We express our sincere thanks to the following colleagues for their kind assistance provided during senior author's studies at their institutions: Dr Axel Hausmann, Dr Wolfgang Speidel and Mr Ulf Buchsbaum (ZSM, Munich, Germany); Dr Thomas J. Witt (†) (MWM/ZSM, Munich, Germany); Dr Alberto Zilli and Mr Geoff Martin (NHMUK); and Dr Marianne Espeland (ZFMK). Second, third, and fourth authors thank the Director of the Zoological Survey of India and Head of the Department of Zoology and Environmental Sciences for providing necessary facilities.

References

Bayarsaikhan U, Lee DJ, Bae YS (2018) A review of *Barsine* Walker, 1854 (Lepidoptera: Erebidae, Arctiinae) in Cambodia, with a new record. Journal of Asia-Pacific Biodiversity 11(3): 377–385. https://doi.org/10.1016/j.japb.2018.05.003

Bucsek K (2012) Erebidae, Arctiinae (Lithosiini, Arctiini) of Malaya Peninsula-Malaysia. Institute of Zoology SAS, Bratislava, 170 pp.

Bucsek K (2014) Erebidae, Arctiinae (Lithosiini, Arctiini) of Malaya Peninsula-Malaysia (Supplementum). Institute of Zoology SAS, Bratislava, 45 pp.

Černý K (2016) A contribution to the knowledge of the *Miltochrista-Lyclene* genus group in South East Asia (Lepidoptera, Erebidae, Arctiinae, Lithosiini). Nachrichten des Entomologischen Vereins Apollo, N.F. 37(2/3): 93–107.

Černý K, Pinratana A (2009) Moths of Thailand (Vol. 6). Arctiidae. Brothers of Saint Gabriel in Thailand, Bangkok, 283 pp.

Dubatolov VV, Kishida Y, Min W (2012) New records of lichen-moth from the Nanling Mts., Guangdong, South China, with descriptions of new genera and species (Lepidoptera, Arctiidae: Lithosiinae). Tinea 22(1): 25–52.

Dubatolov VV, Bucsek K (2013) New species of lichen-moths from South-East Asia (Lepidoptera, Noctuoidea, Lithosiini). Tinea 22(4): 279–291.

Fibiger M (1997) Noctuinae III. Noctuidae Europaeae (Vol. 3). Entomological Press, Sorø, 418 pp.

Joannis Jde (1930) Lépidoptères hétérocères du Tonkin. 3e partie. Annales de la Société entomologique de France 99 (Supplément): 559–835.

Holloway JD (2001) The Moths of Borneo: Family Arctiidae, Subfamily Lithosiinae. Malayan Nature Journal 7: 279–486.

Huang SY, Ji SQ, Wang M, Fan XL (2018) *Barsine paraprominens* sp. nov. (Lepidoptera, Erebidae, Arctiinae, Lithosiini) from China, with notes on four new records. Zootaxa 4457(1): 189–196. https://doi.org/10.11646/zootaxa.4457.1.11

Huang SY, Volynkin AV, Černý K, Wang M, Fan XL (2019) Contribution to the knowledge on the genus *Barsine* Walker, 1854 from mainland China and Indochina, with description of a new species (Lepidoptera, Erebidae, Arctiinae, Lithosiini). Zootaxa 4711(3): 495–516. https://doi.org/10.11646/zootaxa.4711.3.4

Joshi R, Singh N, Volynkin AV (2018) New data on the genus *Barsine* Walker, 1854 from India, with description of a new species (Lepidoptera: Erebidae: Arctiinae: Lithosiini). Zootaxa 4425(3): 456–470. https://doi.org/10.11646/zootaxa.4425.3.2

Kaleka APS (2003) Revival of genus *Barsine* Walker (Lithosiinae: Arctiidae: Lepidoptera) along with description of two new species from India. Journal of Entomological Research 27(2): 93–103.

Kaleka APS (2018) Further studies on genus *Barsine* Walker (Arctiidae: Lepidoptera) along with addition of two species from India. Journal of Entomological Research 42(4): 595–600. https://doi.org/10.5958/0974-4576.2018.00101.9

Kirti JS, Singh N (2015) Arctiid Moths of India (Vol. 1). Nature Books India, New Delhi, 205 pp.

Kirti JS, Singh N (2016) Arctiid Moths of India (Vol. 2). Nature Books India, New Delhi, 225 pp.

Lafontaine JD, Mikkola K (1987) Lock-and-key system in the inner genitalia of Noctuidae (Lepidoptera) as taxonomic character. Entomologiske Meddelelser 55: 161–167.

Reich P (1937) Die Arctiidae der Chinaausbeute des Herrn Hermann Höne in Shanghai. Deutsche entomologische Zeitschrift Iris 51: 113–130.

Rothschild W (1913) New Lithosianae. Novitates Zoologicae 20(1): 192–226.

Spitsyn VM, Kondakov AV, Tomilova AA, Pham NT, Bolotov IN (2018) *Barsine vinhphucensis* sp. nov. from Vietnam (Lepidoptera: Erebidae: Arctiinae: Lithosiini). Ecologica Montenegrina 18: 18–25. https://doi.org/10.37828/em.2018.18.3

Volynkin AV (2018) Four new species of the genus *Barsine* Walker, 1854 (Lepidoptera, Erebidae, Arctiinae) from Oriental Region. Far Eastern Entomologist 358: 1–18. https://doi.org/10.25221/fee.358.1

Volynkin AV, Černý K (2016a) *Barsine amaculata*, a new species from Vietnam (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4200(2): 345–350. https://doi.org/10.11646/zootaxa.4200.2.11

Volynkin AV, Černý K (2016b) A review of the *Barsine flammealis* species-complex with description of a new species from Himalaya (Lepidoptera, Erebidae, Arctiinae). Biological Bulletin of Bogdan Chmelnitskiu Melitopol State Pedagogical University 6(3): 303–310. https://doi.org/10.15421/201699

Volynkin AV, Černý K (2016c) *Barsine deliciosa*, a new species from China (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4200(1): 181–191. https://doi.org/10.11646/zootaxa.4200.1.9

Volynkin AV, Černý K (2017a) A review of the *Barsine obsoleta* species-group with description of a new species from Vietnam. Zootaxa 4254(2): 188–200. https://doi.org/10.11646/zootaxa.4254.2.2

Volynkin AV, Černý K (2017b) On the taxonomy of the *Barsine delineata* species-complex (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4258(2): 138–144. https://doi.org/10.11646/zootaxa.4258.2.3

Volynkin AV, Černý K (2017c) Revision of the *Barsine cardinalis-anomala* 'species-complex' (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4358(3): 441–461. https://doi.org/10.11646/zootaxa.4358.3.3

Volynkin AV, Černý K (2017d) On the taxonomy of the genus *Barsine* Walker, 1854 (Lepidoptera, Erebidae, Arctiinae). Far Eastern Entomologist 346: 17–32. https://doi.org/10.25221/fee.346.3

Volynkin AV, Černý K (2018a) Revision of the *Barsine zebrina* species-complex, with description of three new species (Lepidoptera, Erebidae, Arctiinae, Lithosiini). Zootaxa 4402(2): 339–352. https://doi.org/10.11646/zootaxa.4402.2.6

Volynkin AV, Černý K (2018b) Two new dark colored species of the genus *Barsine* Walker, 1854 from China and Indochina (Lepidoptera, Erebidae, Arctiinae, Lithosiini). Ecologica Montenegrina 19: 61–68. https://doi.org/10.37828/em.2018.19.7

Volynkin AV, Černý K (2019) A review of the *Barsine inflexa* Moore, 1878 and the *B. flavodiscalis* (Talbot, 1926) species-groups, with descriptions of six new species from Indochina, India and China (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4668(4): 543–561. https://doi.org/10.11646/zootaxa.4668.4.7

Volynkin AV, Černý K, Ivanova MS (2018) Revision of the *Barsine punicea* Moore, 1878 species-group, with descriptions of two new species and two new subspecies (Lepidoptera, Erebidae, Arctiinae). Journal of Asia-Pacific Entomology 21: 999–1008. https://doi.org/10.1016/j.aspen.2018.07.020

Volynkin AV, Černý K, Huang SY (2019a) A review of the *Barsine hypoprepioides* (Walker, 1862) species-group, with descriptions of fifteen new species and a new subspecies (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4618(1): 1–82. https://doi.org/10.11646/zootaxa.4618.1.1

Volynkin AV, Černý K, Huang SY (2019b) A review of the *Barsine perpallida-B. yuennanensis* species-group, with descriptions of six new species (Lepidoptera: Erebidae: Arctiinae). Acta Entomologica Musei Nationalis Pragae 59(1): 273–293. https://doi.org/10.2478/aemnp-2019-0022

Volynkin AV, Huang SY, Dubatolov VV, Kishida Y (2019c) *Barsine wangi*, a new species from Guangdong, southern China (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4664(3): 445–450. https://doi.org/10.11646/zootaxa.4664.3.12

Volynkin AV, Černý K, Im KH, Bae YS, Bayarsaikhan U (2019d) *Barsine insolita*, a new species from Indochina and India (Lepidoptera, Erebidae, Arctiinae). Zootaxa 4700(4): 494–500. https://doi.org/10.11646/zootaxa.4700.4.8

Volynkin AV, Huang SY, Ivanova MS (2019e) An overview of genera and subgenera of the *Asura* / *Miltochrista* generic complex (Lepidoptera, Erebidae, Arctiinae). Part 1. *Barsine* Walker, 1854 sensu lato, *Asura* Walker, 1854 and related genera, with descriptions of twenty new genera, ten new subgenera and a check list of taxa of the *Asura/Miltochrista* generic complex. Ecologica Montenegrina 26: 14–92. https://doi.org/10.37828/em.2019.26.3

Walker F (1854) List of the Specimens of Lepidopterous Insects in the Collection of the British Museum. Part I.—Lepidoptera Heterocera. The Trustees of the British Museum, London, 278 pp. https://doi.org/10.5962/bhl.title.58221

Wu Sh, Fu Ch M, Chang W Ch, Shih L Ch (2013) Arctiinae. In: Fu CM, Ronkay L, Lin HH (Eds) Moths of Hehuanshan. Endemic Species Research Institute, Nantou, 308–333.